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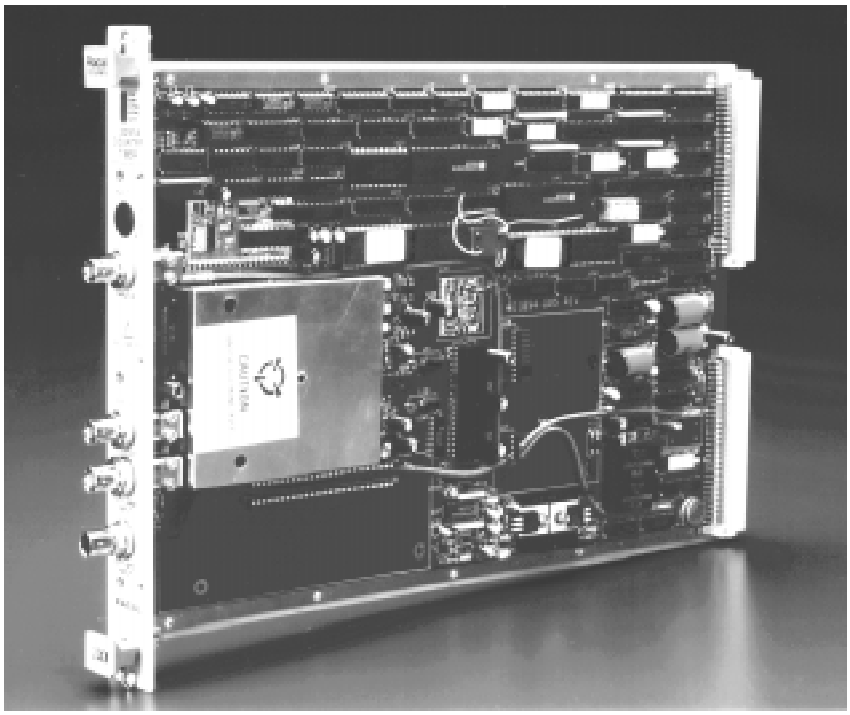
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Find the *Astronics / EADS / Racal 2251* at our website: *Click HERE*

PRODUCT INFORMATION

200 MHz Universal Counter/Timer Model 2251A



- **200MHz Frequency Measurement**
- **1ns Single-shot Resolution (100ps with Averaging)**
- **Comprehensive Arming Capabilities and Trigger Control**
- **Peak Signal Amplitude Measurement**
- **Optional Frequency Measurement to 1.3GHz**
- **Optional High Stability Oscillator**

High Resolution—Automatically
The 2251A offers twelve automatic measurement functions including phase, pulse, peak, rise/fall time, interval and ratio measurement, all with extremely high resolution. Frequency profiling may be performed using minimum gate times and external arming. An optional 1.3GHz, 50Ω, fuse-protected third input is available for RF requirements.

Cost Effective System Capability
The Racal Instruments Model 2251A reduces the size and number of instruments in a test system by providing a single circuit board that offers the sophisticated measurement functions the industry expects from full-sized counter/timers.

Outstanding Resolution
Model 2251A features frequency and period resolution of 9 digits in one second. 1Hz resolution at 1GHz and 10nHz resolution at 10Hz are obtainable in just one second. This exceptional resolution permits evaluation of precision frequency standards.

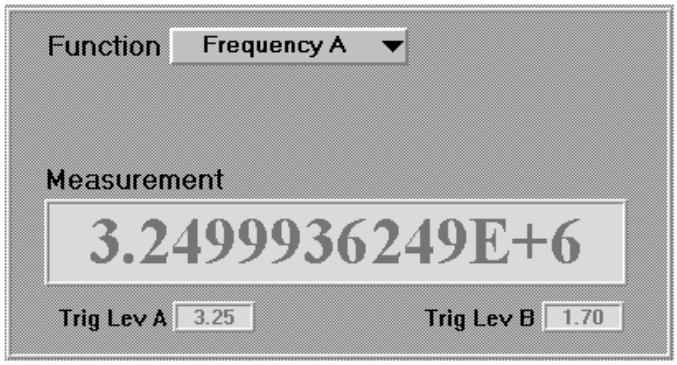
High Speed Time Measurement
By using Time Error Correction (TEC) in combination with traditional reciprocatic techniques, long gate times may be eliminated. The TEC technique permits single-shot time interval measurements with one nanosecond resolution or averaged measurements with 100ps resolution on pulses as narrow as 5ns. This capability allows quick and easy measurement of rise/fall times, propagation delay through integrated circuits and even computer memory access times.

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Powerful VXIbus Format
The VXIbus brings the ability to significantly down-size automatic test systems and to facilitate communication and synchronization between instruments. The Racal Instruments 2251A Universal Counter/Timer exploits VXIbus technology by accessing the CLK10, Analog SUMBUS and TTLTRG lines. The 2251A shares the common system clock, CLK10, thus removing error due to multiple timebases in individual source and measurement instruments. Internal signals from system resources can be routed to the 2251A for verification and comparison via the Analog SUMBUS. The TTLTRG lines are usable as drivers synchronizing other VXIbus modules to the counter's gate signal. A TTLTRG line may also be used to receive synchronizing arming signals from the VXIbus.

"Standalone" Operation-VXI*plug&play*
Still miss the old fashioned GPIB instrument format with a front panel? The 2251A comes complete with a VXI*plug&play* compliant soft front panel giving you full "manual" control whenever you need it.

High Stability Clock Saves Space
With the addition of the Option 11 Internal Precision 10MHz Reference, you can improve the measurement Stability of the 2251A. Option 11 also includes a front panel output which may be cabled externally to improve the 10MHz CLK10 to a 0.01ppm accuracy**.**



VXIplug&play Measurement Display

2251A Specifications

AUTOMATIC FUNCTIONS

Frequency
Channel A: DC to 200MHz
Channel B: DC to 160MHz
Channel C: 40MHz to 1.3GHz
Accuracy: ± Resolution±Timebase Err.xFreq
Resolution (A & B): ±(2 x LSD±1.4 x (Trig. Err./Gate Time) x Freq.)
Resolution (C): LSD
LSD: (1ns / Gate Time) x Freq.

Period
Channel A: 5ns to 1,700s
Channel B: 6.25ns to 1,700s
Accuracy & Resolution: Same as Frequency

Time Interval
Range: -2ns to 800,000s
Slope (Start and Stop): (+) or (-)
Configurations: A B, B A or A A
Accuracy:±Resolution±(Timebase Err. x Time Intvl.)±Trig Lvl. Set Err. ±2ns
Resolution: ±LSD±1ns±Trig. Err.
LSD: 1ns (Average Mode: 100ps)

Time Interval Delay
(Delays Start of Time Interval Measurements)
Range: 200µs to 800ms
Accuracy: ±50µs + 0.1% of Rdg.
Resolution: 25.6µs

Rise/Fall Time
(Channel A, 10% to 90% of Trigger Point)
Range: 20ns to 20ms
Slope (Start and Stop): (+) or (-)
Min. Pulse Height: 500mV_{p-p}
Min. Pulse Width: 20ns at Signal Peaks
Resolution: ±LSD±1ns± Start Trig. Err.±Stop Trig. Err.
LSD: 1ns (Average Mode: 100ps)

Pulse Width
(Channel A, 50% of Trigger Point)
Range: 5ns to 20ms
Slope (Start and Stop): (+) or (-)
Min. Pulse Height: 150mV_{p-p}
Resolution and LSD: Same as for Rise/Fall Time

Frequency Ratio
(Channel A to Channel B)
Range: DC to 100MHz
Accuracy & Resolution: ± LSD±Trig. Err. B / Gate Time
LSD: (10xRatio)/(Fa x Gate Time)

Frequency Ratio
(Channel C to Channel B; w/ Option 41)
Input C Range: 40MHz to 1.3GHz
Input B Range: DC to 100MHz
Accuracy and Resolution: ±LSD± (Trig. Err. B / Gate Time)
LSD: (640 x Ratio)/(F_C x Gate Time)

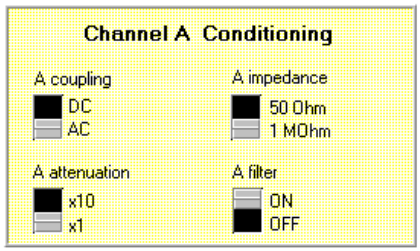
Totalize
(Channel A by Channel B)
Range: 0-100MHz; 1 to 10^{12}-1 events
Maximum Rate: 10^8 events/s
Pulse Width: 5ns Min. at Trig. Points
Start/Stop Control: Channel B
Accuracy & Resolution: LSD
LSD: ± 1 count

Phase
(Channel A Relative to Channel B)
Range: 0.10 to 360 degrees
Accuracy & Resolution: ±LSD±(TI Resolution x 360° /Period A)
LSD:1MHz: 0.1°
10MHz: 1°
100MHz: 10°

Peak Signal
(Maxima, Minima or DC Value)
Frequency Range: DC, 50Hz to 20MHz (usable to 100MHz)
Accuracy (Sine): ±(6% of V_{p-p} ±50mV)
Accuracy (DC): ±(1% of Rdg.±40mV)
Resolution: (x1 Atten.): 20mV
Dynamic Range: 50mV_{p-p} to 51V_{p-p}

Math Mode
(Trigger Level & Gate Time Excepted)
Result: [(Reading - X) x Y] / Z
Constant Range: ±1x10^{-9} to ±1x10^{9}

Averaging Mode
(Totalize Excepted)
Sample Size: 100 Samples



Resolution: 1 Additional Digit

VXIplug&play SFP Input Signal Conditioning Setup Screen

Gate Time
Range: 200µs to 99.999s
Resolution: 25.6µs

INPUT CHARACTERISTICS
(Input Channels A and B)

Frequency Range **(DC Coupling)**
Channel A: DC to 200MHz
Channel B: DC to 160MHz

Frequency Range **(AC Coupling)**
Channel A:10Hz to 200MHz
Channel B:10Hz to 160MHz

2251A Specifications Continued

Low Pass Filter
(Channel A, Selectable)
50kHz BW, nominal
Selectable Input Features
Impedance: 50Ω or 1MΩ
Coupling: AC or DC
Attenuation: x1 or x10
Sensitivity
(Sine Wave, x1 Atten., 0°C to 55°C)
< 100MHz: 25mVrms
< 160MHz: 50mVrms
< 200MHz: 70mVrms
Sensitivity **(Pulse, 5ns Width, x1 Atten.)**
75mV$_{p-p}$
Dynamic Range **(x1 Atten.)**
< 50MHz: 36dB (75mV$_{p-p}$ to 5V$_{p-p}$)
< 100MHz: 30dB (75mV$_{p-p}$ to 2.5V$_{p-p}$)
<200MHz: 24dB (150mV$_{p-p}$ to 2.5V$_{p-p}$)
Maximum Input
Z_{in}=50Ω: 5Vrms
Crosstalk **(100MHz @ 50Ω)**
< -36dB

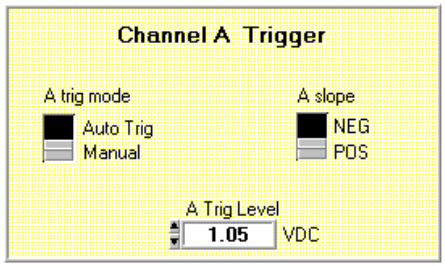
INPUT CHARACTERISTICS

(Option 41: Input Channel C)
Frequency Range
40MHz to 1.3GHz
Input Impedance
50Ω
Sensitivity **(Sine Wave)**
1GHz: 25mV rms
1.3GHz: 50mV rms
Dynamic Range
1GHz: 40dB
VSWR
< 2:1 @ 1GHz
Maximum Input
Operating: 1V rms
Damage Level: 7V rms

10MHz TIMEBASE CHARACTERISTICS

Default
VXIbus CLK10: 100ppm typ.
External Frequency Standard Input
Front Panel BNC
Internal Precision 10MHz Reference **(O**ption 11)
Accuracy: 0.01ppm
Temperature Stability: 0.05ppm, 0°C to 55°C
Aging Rate: 0.1ppm/year
Warm-up: within 0.1ppm in 3 min.
SSB Phase Noise:
-115dBc/Hz @10Hz
-145dBc/Hz@100Hz
-150dBc/Hz @1kHz-10kHz

TRIGGERING



Trigger Setup Screen from VXIplug&play Soft Front Panel

CHARACTERISTICS

General **(Manual or Autotrigger)**
Attenuation Settings: x1 or x10, programmable
Range: ±5.1V x Atten., prog.
Accuracy: ±1% of Trig. Level± (30mV x Atten.)
Resolution: 20mV x Atten.

Autotrigger
Frequency Range: DC, 50Hz to 160MHz (Usable to 200MHz)
Minimum Amplitude: 150mV$_{p-p}$

FRONT PANEL I/O

Inputs
Channel A: BNC, 50Ω or 1MΩ
Channel B: BNC, 50Ω or 1MΩ
Channel C: BNC, 50Ω
External Arm: BNC, 4.7kΩ
Ext. Frequency Std.: BNC, 1kΩ

OPTIONAL FEATURES

(Options 10 and 11 are mutually exclusive.)
Option 10: External Frequency Standard Multiplier
Frequency Input: 1, 2, 5 or 10MHz ± 10ppm
Signal Level: 100mV to 10V rms
Option 11: Internal Precision 10MHz Reference
Front Panel Output: BNC, 50Ω
Specifications: Per Timebase Characteristics
Option 41: 1.3GHz Input C
Frequency Range: 40MHz to 1.3GHz

VXIbus INTERFACE DATA

(Single slot, message based, VXIbus 1.4 compliant)
Drivers
LabVIEW, LabWindows/CVI, VXI*plug&play*, WIN, WIN95, WIN NT Frameworks
Backplane Signal Support
TTLTRG0-7: External Arm Input, Gate Output
CLK10: Default Timebase
SUMBUS: Selectable as Channel A Input
Self-Test
90% Coverage Minimum
Status Lights
Red: System Fail
Green: Channels A & B Common
Green: Channel A Trigger
Green: Channel B Trigger
Green: Gate
Cooling **(10° C rise)**
2.11l/s @ 0.25mm H_2O
Peak Current & Power Consumption

	+24	+5	-5.2	-24
I_{pm}(A)	0.16	2.50	1.60	0.16
I_{dm}(A)	0.16	0.69	0.52	0.16

Total Power: 27 Watts

ENVIRONMENTAL

Temperature
Operating: 0°C to 55°C
Storage: -40°C to 71°C
Weight
3.4 lbs. (1.54 kg)
EMC **(Council Directive 89/336/EEC)**
EN55011, Group 1, Class A
EN50082-1, IEC 801-2,3,4
Safety **(Low Voltage Directive 73/23/EEC)**
EN61010-1, IEC1010-1, UL3111-1, CSA 22.2 #1010

CE The CE Mark indicates that the product has completed and passed rigorous testing in the area of RF Emissions, Immunity to Electromagnetic Disturbances and complies with European electrical safety standards.

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ORDERING INFORMATION		
Model	**Description**	**Part Number**
2251A	200 MHz Universal Counter/Timer	407494-010
Option 10	Frequency Standard Multiplier	OPT-404710
2251A with Option 11	200MHz Universal Counter Timer with Internal Precision 10MHz Reference	407494-011
Option 41	1.3GHz Channel	OPT-404709
2251	1ns Universal Counter	404681-005
2251 with Option 11	1ns Universal Counter w/Internal Precision Reference	404681-008

The Racal policy is one of continuous development and consequently the equipment may vary in detail from the description and specification in this publication.

RACAL INSTRUMENTS

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